

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Dishwashers

I, SVEN GUSTAF NORD, a subject of the King of Sweden of Hanna Paulis gata 13, Hagersten, Sweden, do hereby declare the invention, for which I pray that a patent 5 may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to doors of dish- 10 washing apparatus and especially to a door which in an opening sense is swung outwards and downwards towards a horizontal plane.

An object of the present invention is to 15 provide a light but rigid dishwasher door and to make the door itself a substantial portion of said dishwasher by constructing the door such, that it will support a spray device and devices or containers for dish- 20 ware.

According to the invention there is provided a dishwashing apparatus having a door which in an opening sense pivots outwards and downwards towards a horizontal 25 plane, said door having means for supporting articles to be washed within a casing, supporting said door, in which door there is mounted a rotatable spraying device comprising at least one spray arm provided 30 with spraying apertures and having a longitudinal dimension such, that its outermost portion describes a path adjacent the periphery of the door.

Another important object of the invention 35 is to provide a spraying system comprising the above-mentioned spraying device for enabling spraying and effective cleansing of all dishware placed in the dishwasher.

Furthermore, the invention has the object 40 of providing effective cleansing of the dishware although utilizing a very small quantity of fluid or water in comparison with conventional dishwashers.

The invention will now be described in greater detail by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of a dishwasher casing with its door closed;

Figure 2 shows separately the door of Figure 1 in a closed position;

Figure 3 shows the dishwasher door in an open position;

Figure 4 shows a plan view of the inside of the dishwasher door of Figure 3;

Figure 5 shows an exploded view of the 55 details of the spraying device;

Figure 6 shows a sectional view of the spraying device; and

Figure 7 shows a mounting device for a removable dishwasher door.

A casing 1 of a dishwashing apparatus is shown in a perspective view in Figure 1. The casing 1 is supported on a base and is provided with a water supply tube 1a and a water discharge tube 1b, tube 1a co-operates with an inlet of a spraying device. The tube 1b is connected to the bottom of the casing 1 and discharges water collected in the casing 1. Tube 1b preferably has a greater diameter than has the tube 1a. 65 The casing is provided with upper and lower horizontal surfaces 2, and three vertical surfaces 3. A door 4 on the front of the casing 1 cooperates with the said vertical surfaces. The door 4 is provided with an upper flange 4a for rigidity. The flange 4a extends as a horizontal extension of the upper surface 2 and is provided with a handle 5 for opening the door. The flange 4a can also carry closure means for the door 4. The vertical sides of the door 4 are also provided with flanges 4b for rigidity which gives the door 4 approximately the form of a trough. This is advantageous not only in that dripping water may run towards the bottom of the interior of the 70 75 80 85

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casing but also for providing protection for the spraying device. The door 4 has a lower edge 4c which is shown in more detail in Figure 7 of the drawings.

5 The casing 1 may appropriately be adapted to support a number of additional dishware racks, preferably of plastics covered wire, for plates and utensils. These racks should be placed in such a manner, 10 that the planes associated with the plates are at right angles or substantially at right angles to the plane of the door.

Figure 2 illustrates the door in a closed position so that the position that the dishware will take during the washing is shown.

15 Figure 3 illustrates the door in an open position and shows the simplicity with which the dishware may be placed on the racks, containers or other means attached to the 20 door 4. It is possible to arrange devices cooperating with the door in such a manner that the door has an inclination causing water to flow into the casing. Figures 2 and 3 show the rack for supporting dishware.

25 This rack 6 consists of a plurality of parallel bars 6a which extend substantially parallel to the flat surface of the door 4. Adjacent the centre of the door a tableware container 6b cooperates with the parallel bars 6a 30 in such a manner that the tableware container is mounted at right angles (or alternatively at an angle of 80°) to the bars 6a. Utensils such as small forks, knives and spoons are primarily intended to be placed 35 in said tableware container 6b. Figures 2 and 3 illustrate a spoon 6b with the bowl part of a spoon facing downwardly.

40 Bars 6c extending at right angles to the bars 6a are provided for carrying and supporting glasses 7 or cups turned upside down. These additional bars 6c are mounted between the tableware container 6b and the flange 4a of the door. In certain cases it 45 may be appropriate to make the bars, intended for cups, smaller than that of the corresponding bars 6c for glasses. It has also proved appropriate to provide the upper ends of the bars 6c with a ball of elastic material, for instance of rubber, plastics 50 or the like, for preventing the dishware from sliding. The rack 6 for supporting dishware may appropriately be positioned on that portion of the door 4 that is the highest when the door is closed, and it may 55 also be appropriate to let the rack 6 extend over the total width of the door, which is best illustrated in Figure 4. The tableware container 6b may appropriately be positioned at such a distance from the adjacent bars 6c that it also serves as a support for the dishware placed on said bars 6c. The tableware container 6b may of course 60 also serve as a support for other dishware. The portions of the parallel bars 6a re- 65 mote from the edge 4a of the door are

bent at right angles or approximately 80° to the flat surface of the door, and they extend almost along the entire width of the door 4. They form a support for dishware placed on the rack 6.

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A rotatable spraying device is mounted close to the center of the door 4 and is provided with a number of spray arms 9a-9e having one or more spray apertures or nozzles. The lengths of the longest spray 75 arms are chosen such, that their outer ends will move close to or adjacent the periphery of the door. The spraying device 8 and the spray arms 9a-9e will be described more in detail in connection with Figures 5 and 6.

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From the center portion of the rack 6 additional means 10 for supporting dishware and having the form of a container for carrying both dishware and large tableware such as large knives, forks, spoons etc. extend towards the lower edge 4c of the door. The rack 6 and the additional means 10 may appropriately be united or integral with respect to each other. The large tableware should appropriately be placed with its 90 mostly soiled end close to the center of the door, i.e. adjacent the spraying device 8. The tableware container 6b is also placed close to said center, i.e. adjacent the spraying device 8, which is provided with a spray 95 arm designed in a specific manner and having a spray aperture intended for spraying and cleansing the small tableware in a longitudinal direction with respect to the tableware. Other spray apertures on other 100 spray arms or spray pipes are also intended to cooperate in effectively cleansing the portions of both the large tableware and the small tableware facing the center of the spraying device 8.

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110 Figure 5 shows an exploded view of a number of the details of a spray device provided with facilities for separately spraying different areas of the interior of the washing machine, the details for said separate spraying being shown in Figure 6. The spraying device 8 consists of a hollow cylindrical portion or housing 81, from which straight spray pipes 9b, 9c and 9d extend at right angles. The pipes 9b, 9c and 9d 115 are fixed to the housing at a certain distance from one partly closed end of the housing. Also, a short spray pipe 9a extends outside the housing 81 but in the axial direction of the hollow cylinder or housing, and this pipe is attached closer to the partly closed end of the housing than the pipes 9b, 9c and 9d. In addition to this short spray pipe 9a a longer spray pipe 9e is provided 120 and also extends in the axial direction of the hollow cylinder or housing 81. The spray pipes 9b, 9c and 9d are provided with a plurality of spray apertures, and these spray pipes are primarily intended for spraying and cleansing plates etc. placed in racks 125 130

at right angles to the door 4 in the casing 1 of the dishwasher. It may be appropriate to provide a different number of spray apertures for the individual spray pipes. Spray pipe 9a is provided with one single spray aperture of such design that the water 9a' passing through the spray aperture and directed longitudinally of the small tableware 6b' will have a large dispersion angle. Although this water jet 9a', which may have a form of a pyramid, primarily is intended for cleansing the small tableware placed in the container 6b it will also clean portions of the tableware placed in the container 10. The spray pipe 9e is provided with a number of spray apertures which direct water jets 9e' substantially in the radial direction of the housing. Spray pipe 9e with its spray apertures is intended to direct the spray towards the small tableware positioned in container 6b and the tableware positioned in container 10 in a different direction to the spray from the spray pipe 9a. The water jets from the remainder of the spray pipes may have a conical shape.

It should be emphasized that it has proved appropriate to provide the spray arm or the spray pipes 9c and 9d (see Figure 5) with a plurality of apertures and the water jets will be directed at right angles to the longitudinal axis of each pipe 9c and 9d. The spray arm or spray pipe 9b should be provided with fewer holes and should have its water jets 9b' directed approximately 45° from the longitudinal axis of pipe 9b and directed away from the center portion of the spraying device or the housing 81. In this manner cleansing of the plates etc. positioned in the casing will be ensured. Spray pipe 9e is also provided with apertures of the type mentioned in connection with the description of pipe 9b.

The designation 82 refers to a dish-washing detergent container, the function of which will be described more in detail with reference to Figure 6. However, it may be mentioned that the dishwasher detergent container 82 is provided with a removable cover 83, which in turn is provided with a pull-hook 84 and a central inlet aperture 85. The container 82 itself is provided with a number of small outlet apertures 82', preferably at its upper portion and on its envelope surface. Moreover, spacer means 82" are provided for centering the container 82 in the inside of the housing 81. Before washing the dishes the container 82 is filled with liquid and preferably foaming neutral non-toxic detergents. When water is supplied, as will be described with reference to Figure 6, the dishwasher detergent will progressively be diluted and will be consumed by the passage of the mixture of water and detergent through the apertures 82'.

A valve device 101 surrounds the bottom part of the container 82 and may be introduced into the housing 81. The valve 101 is provided with a circumferential recess 102 as well as a diametrical support 103 adapted to cooperate with a groove 92 in a hollow rod 91 (see Figure 6) said rod 91 extending through the door 4. Valve 101 does not participate in the rotation of the spraying device, due to its interaction with the groove 92, but may be axially displaced, so that, with the valve 101 in one of its positions, the pipe 9a because of its position relative to the pipes 9e, 9c will only be supplied with water during a definite portion of its rotation. In other positions, one of which is shown in Figure 6, separate spraying of the interior of the dishwasher is afforded according to the position of the valve 101. In the illustrated position, i.e. the second position of the valve and the rod 91, an aperture 91a provided in the shaft cooperates with an aperture 93a in the side of a central portion 93 affixed to the door 4 by means of screws or the like. The central portion 93 surrounds the rod 91, which is hollow, and clamps the housing 81 by means of a nut 93d. However, the housing 81 may rotate around the central portion 93. With the rod 91 in the illustrated position fluid or water may pass the valve 101 and then through apertures 93a, 91a that cooperate with each other and furthermore to the hollow rod 91 and through apertures 91b, 93b that cooperate with each other. The aperture 93b is connected to a horizontal pipe 120 (Figure 1). The water passes through the pipe 120 and is supplied to a conduit in the dishwasher cooperating with the pipe 120 which conduit may appropriately be provided with spray apertures. An appropriate coupling will naturally have to be provided between the casing 1 of the dishwasher and pipe 120 on the outside of the door 4. Rinsing of the interior of the dishwasher can then be provided merely by depressing rod 91. Spring means (not shown) resets the shaft to its normal position (indicated by a dotted line) in which apertures 93a, 91a and 93b, 91b do not cooperate with each other and water may be supplied to pipes 9b, 9c and 9d.

Figure 6 illustrates the manner in which a container 82 filled with detergent is positioned within the hollow cylindrical portion 81 with valve means 101 when the door 4 has assumed a nearly completely closed position. With the door in completely closed position a gasket 81 will provide a seal against a conical portion 20. The delivery of water through an aperture 23 cooperating with tubing 1a will make the water pass into and around the container 130

82. Part of the water mixes with the detergent positioned in container 82 and will pass out through the outlet apertures 82 and thereafter through the various spray 5 pipes, for instance pipes 9a and 9b. The water that thus has been used will run down into the lower portion of casing 1 and through the outlet tubing 1b.

The spraying device 8 or the hollow 10 cylindrically shaped portion or housing 81 may be rotated by means driving the conical portion 20.

Figure 7 illustrates an appropriate removable interconnection between the door 15 4 and the casing 1. This enables removal of the door 4 when desired. The lower portion of casing 1 is trough-shaped and is provided with two substantially vertical grooves 72 facing each other and each being 20 adapted to cooperate with individual pins 74 mounted at the lower edge 4c of the door 4. When the door 4 is closed its lower portion 4c lies within the casing 1. By means of a seal 73 having elastic properties 25 fastened to the casing 1 or the lower portion 4c of the door 4 a desired seal with respect to water leaks between the lower edge 4c of the door 4 and casing 1 is achieved.

30 Under certain circumstances, it may be appropriate to seal the central inlet aperture 85 in the detergent container 82 with a wax or similar material that will melt at a temperature of for instance 40°C, 35 thereby enabling initial prewashing of the dishware with cold water without detergent, before the cleansing with warm or hot water together with a detergent is initiated.

It will be apparent that the disclosed 40 embodiment is merely exemplary and that a number of different changes in the structural details as well as combinations may be made within the scope of the invention as defined in the appended claims. Thus 45 the invention does not exclude the utilization of various conventional rotatable spraying devices positioned within the periphery of the door 4. It has also proved possible to utilize one or more spray devices which 50 may be connected alternately during the rotation.

The spray pipe 9a is disclosed as being provided with one single nozzle, and this 55 may supply a spray of the International Spraying Systems Standard full-cone type or a pyramid type having a wide apex angle, thereby providing a very great number of separated liquid particles that displace the air so that they strike spoon bowls for 60 example, placed at the bottom of the tableware container 6b only at a distance from the nozzle of approximately an inch, with a high speed. A nozzle of this type requires a great deal of fluid and would mean a 65 waste of fluid or water if the dishware

(tableware) were not placed close to the axis of rotation of the spraying device, so that the greater portion of the fluid is utilized for the pertinent articles. This also refers to the larger knives etc. positioned in the 70 device 10. With respect to the substantial consumption of water it is appropriate to provide this nozzle of the pipe 9a with fluid or water only during the portion of the rotation when the nozzle actually sprays the 75 tableware in container 6b and possibly in container 10.

The separate spraying as above described will become more effective when the water supply through spray pipes 9b, 9c and 9d 80 is cut off by means of valve 101. If the separate rinsing is to be carried out without tubing 120 it is possible to arrange a pipe parallel to the axis of rotation of the spraying device so that it passes through 85 a suitable coupling between portions 20 and 81, wherein a further tube cooperating with portion 20 may be utilized as separate rinsing means.

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WHAT I CLAIM IS:—

1. A dishwashing apparatus having a door which in an opening sense pivots outwards and downwards towards a horizontal plane, said door having means for supporting articles to be washed within a casing supporting said door, in which door there is mounted a rotatable spraying device comprising at least one spray arm provided with spraying apertures and having a longitudinal dimension such, that its outermost portion describes a path adjacent the periphery of the door.

2. A dishwashing apparatus as claimed in claim 1, in which said door is provided with bent-over, peripherally arranged flanges.

3. A dishwashing apparatus as claimed in claim 1 or claim 2, wherein said spraying device is provided with a centrally located housing, in which a container for a washing agent, such as detergent, is positioned.

4. A dishwashing apparatus as claimed in claim 1, wherein said spraying device comprises a hollow cylinder provided with a plurality of said spray arms extending radially of said cylinder and parallel to said cylinder axis respectively.

5. A dishwashing apparatus as claimed in claim 1, wherein said means for supporting articles to be washed comprises a container, which container is positioned adjacent to the axis of rotation of said spraying device.

6. A dishwashing apparatus as claimed in claim 5, wherein said spraying device comprises at least one additional spray arm provided with a spray aperture for directing a jet of water in the longitudinal direction of said articles to be washed.

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7. A dishwashing apparatus as claimed in claim 1, wherein said spraying device surrounds valve means, which valve means controls the discharge of water through said 5 at least one spray arm in the apparatus.

8. A dishwashing apparatus having a door substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

9. A dishwashing apparatus substantially 10 as hereinbefore described.

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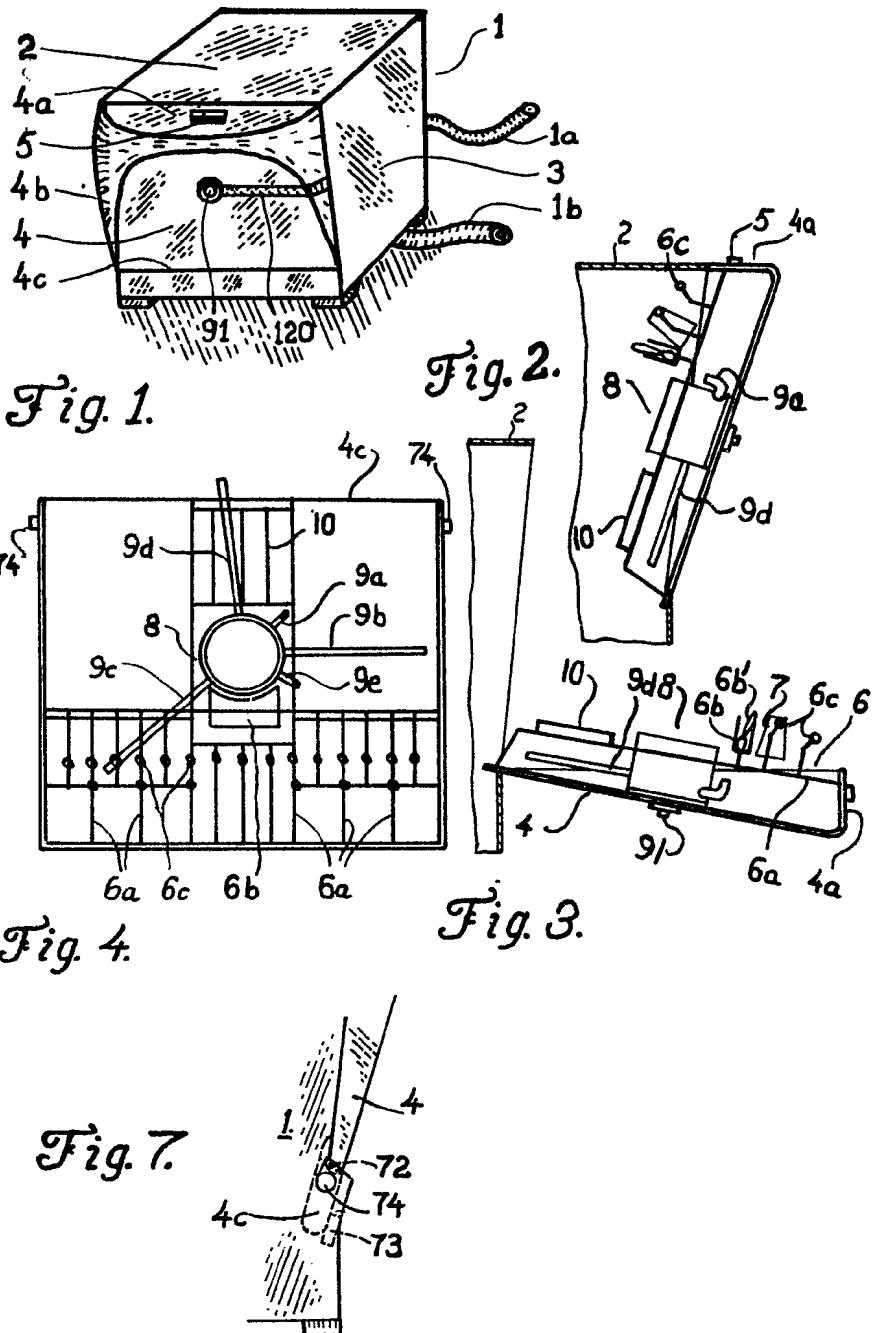
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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of
the Original on a reduced scale.
SHEET 1



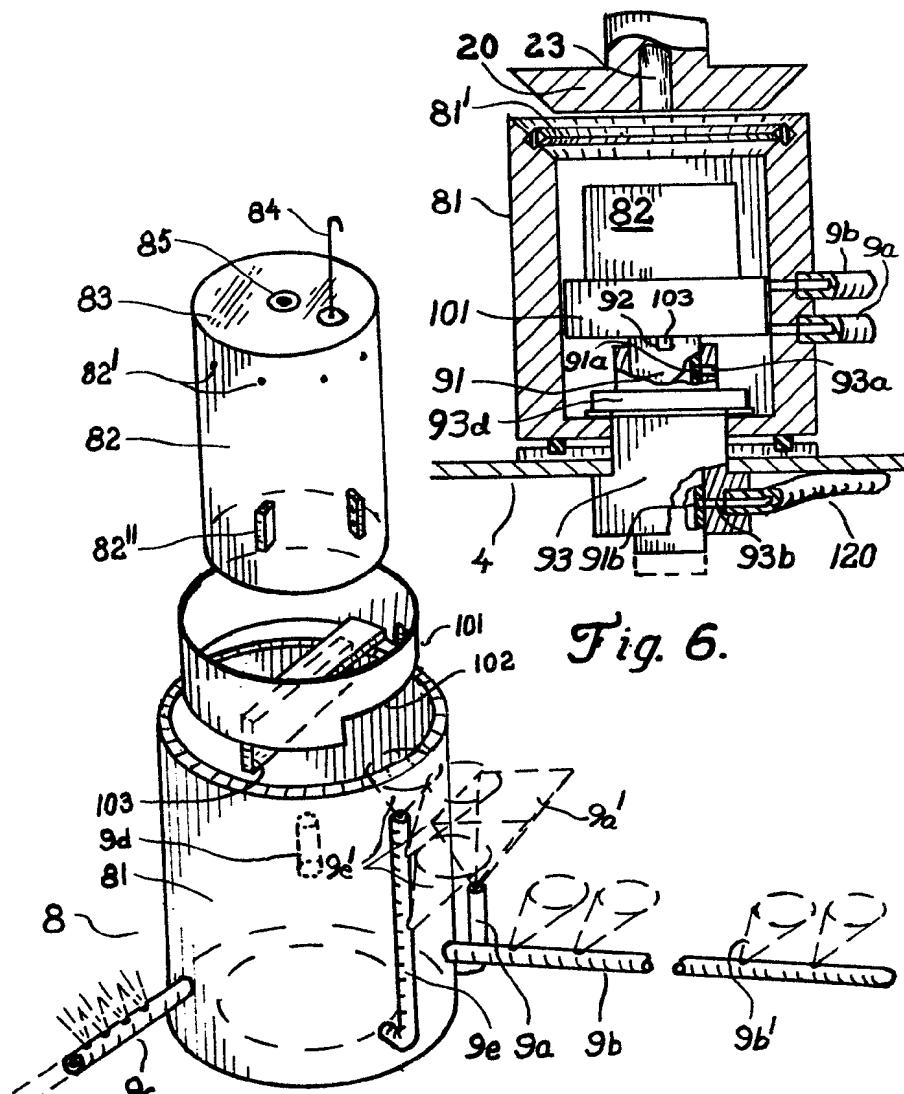


Fig. 5.

Fig. 6.